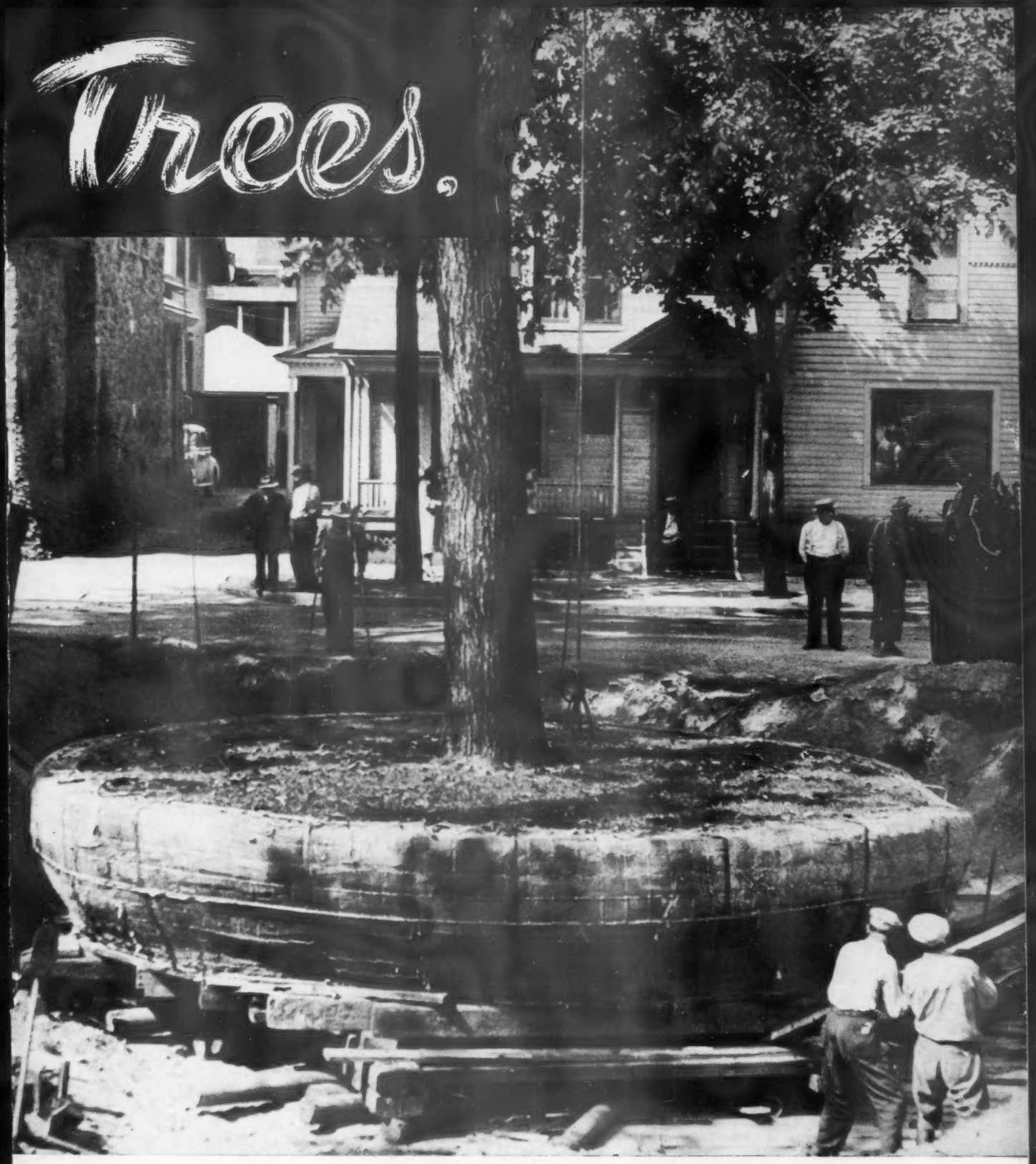
Trees.



Seventy-five Tons of American Elm *(Story Page 8)*

AERATION OF TREE ROOTS — *Charles F. Irish*

GEORGE E. STONE—PIONEER ARBORIST — *A. Vincent Osmun*

April 1945 — *The Journal of American Arboriculture* — 35 Cents

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Summer Spra-Cream is a creamy, white 83 percent oil emulsion that has a long record of effectiveness and safety. It is a stabilized emulsion and is made with the care that characterizes all B. G. Pratt's oils, yet it is low in cost and economical to use.

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for EVERY PURSE

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Vol. 6 Bi-Monthly No. 2

Subscription Price $2.00 Per Year

The Editors of TREES invite discussions, comments and all types of literary materials pertaining to trees and tree preservation from any person engaged either in the scientific advancement or commercial development of the field.

Cover Picture, courtesy C. L. Wachtel, Wauwatosa, Wis.

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TREES Magazine is a bi-monthly Journal published at Santa Monica, California, by Edward H. Scanlon, and is devoted to the furtherance of the technical and business administration of Trees (Street and Ornamental); Parks (Municipal and National); and Forests (State, National and Private), in the U. S. P. O. Box 886, Santa Monica, California. Subscription by mail $2 per year; outside United States, $2.50. Advertising rates upon inquiry. Unsolicited manuscripts must be accompanied by return postage.

ALONG THE WAY

With . . . EDW. SCANLON

■ There will only be TWO ISSUES OF TREES this year. It's the NAVY'S FAULT they didn't TURN ME LOOSE soon enough to work up a FULL SCHEDULE. All subscriptions will be EXTENDED TO COVER SIX ISSUES. We pray that next year this STUPID WAR will be over, everybody will be BACK HOME where they SHOULD BE, and we will all get back to SOMETHING CONSTRUCTIVE—and I don't mean THE W.P.A.

• • •

■ *While waiting for an appointment THE OTHER DAY in L. A. I thought I would "browse" around AN OLD BOOK SHOP. Boy was that a LUCKY "BROWSE." The first thing I saw was "TREES IN AMERICA" looking very OLD AND DOWN AT THE HEELS. Well it had a right to look that way. It had been PUBLISHED IN 1846. That's a long time to be BANGING AROUND. The author WAS D. J. BROWNE. My friends THAT IS A BOOK. The author evidently KNEW HIS WAY AROUND the BARTRAM GARDENS as well as most of the gardens of England, Italy, France and other countries. It is NOT MERELY a description of the trees botanically, but goes, at length into the GEOGRAPHY AND HISTORY, Soil and Situation, PROPAGATION AND CULTURE, Accidents and Diseases, Properties and Uses. HERE'S AN INTERESTING QUOTE: "The European Sycamore (Acer pseudo-platanus) appears to have been introduced into the United States by Governor Christopher Gore, prior to 1810. The trees are said to be growing on the estate which he formerly occupied in Waltham, Mass., and have attained a considerable size." He describes about 300 species and varieties. GOOD HUH?*

• • •

■ I HEAR that our friend ROBERT THE THOMPSON had a little CAVITY WORK done on HIS MIDRIFF some time ago. Took out his GALL BUSINESS. What's ROBERT going to do without that VALUABLE ASSET?

• • •

■ *TED HOLDERNESS is now the EXCITY FORESTER OF PASADENA. He's fixing FAKE TREES and things for the MOVIES AT PARAMOUNT.*

• • •

■ Stopped in at RAY HARTMAN'S LEONARD COATES NURSERY JOINT in San Jose several weeks ago and you should SEE HIS DESK. No wonder he NEVER ANSWERS a letter. Noticed a paper near the TOP OF THE PILE that announced the "ARMISTICE".

• • •

■ *After the last war they planted MEMORIAL TREES outside of Santa Barbara on Highway 101. THE CARE they have had IS A DISGRACE. Then too, the species (QUERCUS AGRIFOLIA) just DOES NOT SEEM TO DO, particularly in most ORNAMENTAL OR STREET PLANTINGS. It is a BEAUTIFUL TREE and we REGRET having to admit ITS INADEQUACIES, having been such a STRONG BOOSTER of it FOR YEARS. However another oak, under observation for years, seems to be a WORTHY SUBSTITUTE. It is the Holly Oak, QUERCUS ILEX, and has the same form and GENERAL CHARACTERISTICS as agrifolia.*

■ THIS IS MORE LIKE IT lads. Back to NORMAL—no more SNAFU, I hope. Trouble with THE NAVY IS they AREN'T TREE-MINDED. Amen.

• • •

■ *BRO—THER! Can you imagine MIKE HARTNEY OUT SKINNING. That, I want TO SEE!*

• • •

■ You should have SEEN FRED ROEWEKAMP and DANA BOWERS giving a demonstration with a MALL CHAIN SAW. That saw sure had the BOYS SWEATING. Seemed funny to see THEM WORKING—and I've got A PICTURE TO PROVE IT.

• • •

■ *ED HIGGINS has opened a new office at WHITE PLAINS, N. Y. Look out for NORM ARMSTRONG, Ed, he'll CONVERT YOU.*

• • •

■ EVERYTHING SEEMS to be PRETTY QUIET on the EASTERN TREE FRONT. Too quiet—let's ERUPT WITH SOME MISSLES, lads.

■ *After much CAREFUL DELIBERATION (about one minute) it has been decided by the JANITOR AND ME (I'm the janitor too) that the price of BEANS as well as PRINTING and ETCETERA was too, too high, SO UP GOES THE PRICE OF TREES. My bones are ACTUALLY RATTLING around in the PRETTY SUIT I got with that MUSTERING OUT PAY, so I figure I had better start EATING MORE REGULAR, so from now on the tariff is 2 SMACKEROOS per annuanum for TREES. (2 BUCKS TO THE MORE ERUDITE.)*

■ JACK KENEALY ought to be very busy about this time SNEAKING UP TO swat those POOR LITTLE BORERS. Jack was a busy, BUSY LAD about a month ago.

• • •

■ *ARCHIE PRICE is a bomber-builder, but still MAINTAINS HIS CONTACT with clients—having an "AFTER 5 P. M. AND SUNDAY" service.*

• • •

■ BARNEY BARTLETT tells me that RAY OVERTON, his right hand man, is now a SHAVETAIL, and is in the Philippines. Hope you get home in time for the *NEXT CONFERENCE, RAY.*

• • •

■ A couple of OTHER LADS in the NAVY are W. F. ABBOTT, Wells, Maine, and ROBERT LOGAN of Buffalo. Both in the SOUPAC.

• • •

■ *ANOTHER CITY has lost a GOOD CITY FORESTER. MALCOLM MILNE of Rochester, is in the market for a BALE OF ASPIRIN. He has gone into the "SKINNING" business as MONROE TREE AND LANDSCAPE CONTRACTORS. Good Luck!*

• • •

■ WHERE'S Frank Hanbury?

• • •

■ *And BILL ROSE?*

• • •

■ Stopped at MILLS COLLEGE (girls school, yum) near OAKLAND with Dana Bowers (OF ALL PEOPLE) and ran into HOWARD McMINN (author of MANUAL OF PACIFIC COAST TREES). He sure has some fine CEANOTHUS and other NATIVES GROWING on his hillside.

Western Chapter at Santa Ana

Because of existing conditions only a small informal meeting is scheduled for the Twelfth Conference of the Western Chapter, National Shade Tree Conference.

The meeting will be held in Santa Ana, with Chapter president, Dale Griggs, presiding, on May 25th, one day only, but quite a nice group is expected in spite of restrictions.

PROGRAM

TWELFTH ANNUAL MEETING
WESTERN CHAPTER
NATIONAL SHADE TREE CONFERENCE
May 25, 1945
Santiago Park, Santa Ana, California

8:30 A. M.—Registration.
9:00 A. M.—Address of Welcome—Mayor Asa Hoffman.
9:20 A. M.—Response—President Griggs.
Appointment of Committees, Auditing, Resolutions and Nominating.
9:30 A. M.—"Living Memorials"—Ralph D. Cornell, Landscape Architect.
10:00 A. M.—"Local Needs for Park and Tree Beautification," Charles Eliot, Haynes Foundation, Los Angeles, California.
10:30 A. M.—"Utilities and Trees," Ross McIntire, Forestry Dept., Los Angeles, California.
C. E. Lee—Public Relations, Southern California Edison Co.
11:00 A. M.—Business Meetings:
Report of Treasurer.
Report of Committees.
Election of Officers.
Report of Arboretum Committee, Maunsell Van Rensselaer, Director of Santa Barbara Botanic Garden.
12 Noon—Luncheon.
1:30 P. M.—Forum—Tree Diseases, Propagation, Pruning, Planting.
Discussion.
2:00 P. M.—"Common Errors in Tree Pruning," Shirley Rowland of Rowland & Newhouse Tree Service, Los Angeles, California.
2:30 P. M.—"New Equipment and Materials," F. W. Roewekamp, Landscape Architect, Los Angeles, California.
Discussion.
3:00 P. M.—Installation of Officers.
3:15 P. M.—Demonstration of Equipment.

■ Here's an OPPORTUNITY for some GOOD PUBLICITY for TREE PRESERVATION. A friend of mine, A SCENARIO WRITER, would like to WRITE A STORY to be titled "THE TREE DOCTOR." He would like to get SOME INTERESTING, COMICAL or DRAMATIC incidents that have happened to some of you "BUZZARDS." Send them in and LET'S SEE WHAT HAPPENS. (SUGGEST A NAME if you don't LIKE THE ABOVE.)

• • •

■ *Has Anyone an EXTRA COPY they would LIKE TO SELL, of John Davey's "THE TREE DOCTOR" or B. E. Fernow's "THE CARE OF TREES IN LAWN, STREET AND PARK," Along-the-Way would LIKE TO BUY.*

April 1945 *The Journal of American Arboriculture* Volume 6 — No. 2

EDWARD H. SCANLON, Editor
P. O. Box 886—Santa Monica, California

"No place is complete without trees. A home without trees is charmless; a road without trees is shadeless; a park without trees is purposeless; *a country without trees is hopeless*"

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Cordially Yours

NEW MEMBERS ON EDITORIAL BOARD

TREES in its seven years of existence has made a sincere effort to give the Arborists, Park men, City Foresters and all people interested in trees and their care a complete, authoritive journal. To furnish the profession with a publication that would serve as a meeting place for scientists and professional men throughout the Nation has been our goal. How close we have come only you, the reader, is the judge.

In this effort we have invited prominent men to act in an advisory capacity; to criticize or demur as they saw fit, in the proper presentation of that which they considered best for the profession as a whole. The deep interest these men have for the profession is shown by the number who have accepted invitations to serve on the Advisory Council of TREES. Recently the Council was augmented when three distinguished scientists agreed to serve and lend their influence to the further development of Arboriculture. These gentlemen are: Professor Forrest C. Strong, Assistant Professor of Botany, Michigan State College, East Lansing—Mr. Strong is also President of the National Shade Tree Conference; Dr. Curtis May, Senior Pathologist, Bureau of Plant Industry, United States Department of Agriculture, Beltsville, Maryland—Dr. May is now engaged in a program devoted to shade tree research; Dr. Malcolm A. McKenzie, Research Professor of Botany, Massachusetts State College, Amherst. Dr. McKenzie, for years, has been active in Bay State arboricultural affairs and is the author of many fine papers.

These gentlemen are most cordially welcome to the Advisory family of TREES and we invite them, as well as all other Council members, to use the editorial page whenever they have a message for the Arborists of America.

A TREE FOR EVERY PLACE, ETC.

The time has long since passed when the Tree Warden, City Forester, Park Superintendent or whoever is delegated the planting and care of city street trees can go merrily along his way disregarding everything but his trees.

Sad, but true. Unfortunately there are other factors to be considered beside the mere planting wherever the spirit moves.

The poor old taxpayer might love and fight for his trees, but he also likes his house lit up at night; he likes to phone his poker pals. He becomes very irked when he drives along a street at night where the lights are obscured by poorly placed or improperly cared for street trees. Maybe he doesn't know whom to blame, and as for that we think he would not be far wrong in laying the blame in three or four different laps.

The coordination of public utilities, wires, trees and street lights is an intelligent must that should have immediate attention. Working the problem out amicably is very definitely within the realm of possibility and will not only reduce maintenance costs in all three fields but will infinitely enrich the appearance of our streets and cities.

TREES wishes to go into this subject thoroughly and invites comment from all interested persons.

"There Were No Trees on Iwo...."

In the ashes spewed from Hell to form the island of Iwo,
Nothing grew;
No grass, no flowers, no trees,
Nothing.
There was nothing there but the Japanese.
Nature had provided no flagstaff for this outpost of desolation;
But the United States Marines brought a staff for a flag from a land of God's creation,
Raising it over this abomination,
In triumph; to the Devil's consternation.
Now this Nation, whose trees grow tall—
Though not to the stature of these its men, in history—
To staff the flags they raise,
Does dedicate, from her forests, the best
To commemorate their victories;
To live, as they lived
For the greater good of the land they loved.

SAM DUNCAN,
2nd Lt., Army Air Corps.

Bug and Borer Control

NICOTINE SPRAYS: As a conservative measure, growers should give serious consideration to the value of soap as a spreader for Nicotine, particularly since there is a critical shortage of Nicotine Sulphate.

A spray solution which contains only Nicotine Sulphate 30% and water is referred to as a physical mixture. Until the Nicotine is set free in this solution a satisfactory "kill" is not accomplished. By adding C. P. O. (a soap spreader) to this solution a small amount of free alkali is formed. This chemical reaction liberates (makes available) the Nicotine thus affording a better kill.

A contact insecticide, as the name implies, should be used only when the insect pest is present. Therefore, contact sprays should be applied under conditions when the speed of evaporation is slowest, i. e., on dull, humid days. When contact sprays evaporate or dry quickly a lower "kill" can be expected.

Contact sprays can be used during the entire growing season depending upon the life cycle of the insect pest. The Euonymus Scale, Oyster Shell Scale (on lilac) hatch in the eastern part of Pennsylvania and vicinity late in May and early in June. C. P. O. and Nicotine are very effective for the control of these insects during this crawling stage. Many growers have found this control method more desirable and safer than certain forms of summer oil sprays. C. P. O. does not discolor foliage.

Lace Bug (on azalea and rhododendron). The first brood makes its appearance immediately after the blooms fall. The second brood appears during August and September. Azaleas and rhododendrons which are subjected to western exposure are usually more heavily infested than plantings which do not receive the maximum amount of direct sunlight.

Red Spider infestation is usually more severe after the absence of heavy rains. While Lime Sulphur is one of the accepted control measures, many nurserymen avoid the use of this preparation because it discolors foliage and renders the specimen temporarily unsalable. C. P. O. and Nicotine will give satisfactory control over Red Spider without affecting the appearance of the specimen.

Magnolia Scale and Tulip Tree Soft Scale: The young crawling Scales make their appearance during the latter part of September. Again, C. P. O. and Nicotine are the accepted control measure of the commercial nurseryman.

European Elm Scale: Newly hatched insects make their appearance during the last two weeks in June and should be sprayed at this time with C. P. O. and Nicotine combination.

Although only a few of the major pests have been discussed, the manufacturers of C. P. O. will advise growers regarding their insect problems. This service is rendered without obligation.

CRYSTAL BORER REPELLANT: This material has been used extensively for the past ten years as an aid to reduce borer injury to many forms of deciduous trees. It should not be confused with insecticides; it is a repellant as the name implies. When considering control measures, the life sycle of the borers and their relation to the host plants are of paramount importance. The life cycle of most borers consists of four stages: adult, egg laying period, the larvae and pupa stages. Crystal Borer RePellant should be applied just before the adult moth or beetle makes its appearance for the egg laying phase. Borers lay their eggs during the greater part of the growing season, e. g.,

ASH	Moths of the Carpenter Worm emerge in June and July.
BIRCH	Bronze Birch Borer which is very destructive to the European White Birch emerges late May and early June.
DOGWOOD	The egg of the Twig Girdler are laid during June and July and hatch in about ten days.
HEMLOCK	Eggs of the Spotted Hemlock Borer are deposited during June and July. This insect is also known as the Flat Headed Borer.
POPLAR	The larvae of the Poplar Borer cause blackened and swollen scars in the trunk and branches. The eggs are deposited by the female in slits in the bark during July and August. This egg laying period has been known to extend over August and September.

CRYSTAL BORER REPELLANT is economical because of its good covering qualities. It contains an effective but safe volatile repellant. The manufacturers have no report of injury resulting from its application. The unusual record is of special interest because many chemicals used for insect control must be used with a degree of caution.

Another 'White Man Curse' for South Seas

American pole-climbing spikes are the latest rage of native Papuans who can climb trees barefooted with the speed of a monkey.

The natives saw American Army Signal Corps men using spikes to string wires on Biak Island of Dutch New Guinea.

Now the spikes are the No. 1 priority on a Papuan's list, ahead of such useful things as an American machete or canteen.

THRU the MICROSCOPE

BY P. P. PIRONE
New Jersey Agricultural Experiment Station

Despite the curtailment of research on shade tree problems during the past year, several papers have been published which will be of interest to arborists.

Feeding Trees Through Leaves—For several years, this writer has called attention to the need for investigating new methods of fertilizing trees. The standard "punch hole and fill" technique cannot easily be used for trees growing along city streets where cement pavements and sidewalks cover most of the normal root area. Many trees growing in our large cities, therefore, seldom if ever are fertilized because of the lack of a simple, inexpensive way to apply plant foot. The recent progress report (1) by J. M. Hamilton, D. H. Palmiter and L. C. Anderson offers a new and highly interesting approach to the tree-feeding problem. These workers applied the nitrogen directly to the leaves instead of putting it into the soil. Their work was based on the assumption that nitrogen can enter the leaves and be assimilated in appreciable quantities. The work was conducted on several varieties of mature and medium-sized apple trees. Nitrogen carriers were incorporated in several types of sprays includiing wettable sulfur, lime and arsenate of lead. Among the several nitrogen carriers tested, Uramon (urea) showed greatest promise. Three or four spray applications were made and significant increases in the nitrogen content of McIntosh trees low in vigor were noted. The nitrogen content of leaves from trees receiving a soil application of ammonium sulfate was only slightly higher than leaves of trees sprayed with Uramon. The latter trees were sprayed from the outside only. There is a possibility that even more striking results would have been obtained if the trees had been sprayed from the inside as well, since the authors point out that unpublished data (not considered at the time the sprays were applied) indicate that nitrogen enters mainly through the undersides of the leaves. This writer feels that this work should be tested on shade trees low in vigor. It may solve the problem of supplying nitrogen to many street trees whose roots can not be reached by soil treatments.

Blister-Rust Resistant Pines—As many arborists know, white pines in many parts of the country are subject to the blister rust fungus, the alternate stage of which attacks species of *Ribes*. One way of preventing infection in pines is to grub out and destroy all species of currants growing within a certain distance of the pines. It is needless to add that such a practice is quite expensive. Consequently scientists are investigating other methods of keeping the blister rust fungus under control. One method is to select and breed white pines that are resistant to the rust fungus. Work along this line has been

(Continued on page 12)

Trees...

George E. Stone — Pioneer Arborist

Famous Arborists Series No. 1

(Editor's note: This is the beginning of a series of biographies to acquaint Arborists and others with the lives of the men, both professional and scientific, who have contributed to the advancement of the profession of Arboriculture. These biographies are written by men who were well acquainted with the subjects and can bring in intimate ancedotes on their lives that make interesting as well as informative reading. The order in which they appear has no bearing on the importance of their contributions.)

By A. Vincent Osmun
Massachusetts State College, Amherst, Mass.

George Edward Stone, 1860-1941. Scientist of note: botanist, plant physiologist and pathologist; student and teacher of trees, in particular.

Doctor Stone's love of trees was genuine and inborn; probably more than any other influence it led him in professional life to make trees the object of his special attention. During a long period this interest was centered on the study of trees of highway and park; on their characteristics and adaptability; their care, protection and preservation.

It was perhaps inevitable that Stone the student should become interested in the scientific aspects of tree study during his undergraduate days at Massachusetts Agricultural College, for there President William S. Clark had, a few years earlier, founded the Department of Botany and carried on pioneer studies of growth and sap flow in trees. Some of Clark's experiments are classic. They brought fame to the then young agricultural college and established a tradition there which later was to be carried on by Stone the teacher and researcher. A period of training at Massachusetts Institute of Technology, after leaving Amherst, was followed by postgraduate study in Germany at the University of Leipzig where he received his doctorate in 1893. While in Germany his interest in trees and tree diseases received further stimulus from the work of Robert Hartig, who has been called the "Father of Forest Pathology," at that time stationed at Munich. Soon after returning to this Country, Stone was called to join the teaching staff of his Alma Mater at Amherst and a year later the duties of Botanist of the Massachusetts (Hatch) Experiment Station were added to his responsibilities. He continued in this dual capacity of teacher and researcher until his retirement in 1916.

Throughout this period and to a constantly increasing extent his interest in trees was apparent both in his teaching and in the written reports of his observations and research. His first attempt to establish a college course in shade tree management, was, by his own testimony, in 1895*, when he gave a course of lectures dealing with the subject. The first formal offering of this course is found in the catalog of the College for 1907 under the title, "Physiology and Pathology of Shade Trees," but personal recollection and many photographic records of students at work on various phases of tree repair place the beginning of laboratory practicums well back of 1900. The results of his own research, experiments and observations in field and laboratory, and the practices and experience of tree workers everywhere, furnished materials for the course. The

(Continued on page 15)

Left. At the dedication of the George E. Stone Laboratory 1936. Left to right: The late Dr. E. P. Felt, Frank A. Bartlett and the late Dr. George E. Stone.

Right. About 1904. Cavity repair by students of Dr. Stone.

*Mass. Agr. Expt. Sta. Bul. 170:171, footnote. 1916.

Ten States Observe National Arbor Day

A splendid beginning has been made, after a poor and late start, toward effecting a unified observance of Arbor Day.

The Governors of ten states who had been apprised of the effort by Dr. Richard P. White, secretary of the American Nurserymens Association, Dr. L. C. Chadwick, secretary of the National Shade Tree Conference, Will O. Doolittle, secretary of the American Institute of Park Executives and TREES, have declared the last Friday in April as Arbor Day.

The Governors and the states they represent, who are cooperating in this movement to more effectively bring to the American people a greater appreciation of the cultural, esthetic and commercial values of trees, are: Virginia, Governor Colgate W. Darden, Jr.; Arkansas, Governor Ben Laney; Michigan, Governor Harry F. Kelly; Connecticut, Governor Raymond E. Baldwin; South Dakota, Governor M. Q. Sharpe; Indiana, Governor Ralph F. Gates; New Mexico, Governor John J. Dempsey; West Virginia, Governor C. W. Meadows; Nevada, Governor E. P. Carville; Idaho, Governor Charles C. Gossett.

The fact that these states are very widely separated bears out the contention of the proponents for the plan that climate should not be considered to great an obstacle in the face of the greater good that could be accomplished by a single coordinated day of observance nationally.

Where weather does not permit, and that is a gamble at best because the Governor, where a date is proclaimed each year, must issue his proclamation at least a month in advance, the actual planting can be done later. And who can "guess" a good day at that time of the year.

Quite a few other states would have joined the group this year except that the appeal was issued after they had selected a date. In other states the date is set by statute, but in one case, Mississippi, Governor Thomas L. Bailey, has informed us that "at our next regular session of the Legislature in January I will be glad to take up this matter with the idea of coordinating the state and national observance of this significant day." Governor Walter S. Goodland of Wisconsin, stated he had already issued his proclamation when the request was received. Otherwise he would have been pleased to cooperate.

It is hoped that next year we shall enlist many more states under the banner and to persuade the Governors to submit legislation to permanently establish Arbor Day nationally.

A copy of the proclamation sent to the Governors for issuance follows:

PROCLAMATION
OF
NATIONAL ARBOR DAY

WHEREAS: It has long been an established custom in the United States, for the various states, to set aside one day in the year on which to study and to plant trees, and

WHEREAS, the designation of this day is left to the discretion of the Governor in many states, and

WHEREAS, due to the climatic differences this designation varies in many parts of the country to the extent that seldom in any two of the states the same day of the year is designated, and

WHEREAS, it is realized that climatic discrepancies may affect the actual planting on the same day throughout the states, still in the interests of a unified, national OBSERVANCE which would tend to more greatly impress on a greater number of people the economic, civic, cultural, esthetic and horticultural values of trees to the nation as a whole, now

THEREFORE, I, as Governor, hereby designate and proclaim the last Friday in April as

NATIONAL ARBOR DAY

in the Great State of.....

I urge that all schools, civic organizations, newspapers, radio and the various political subdivisions collaborate to bring to our citizens a realization of the manifold benefits to be derived from the planting, care and knowledge of trees. I urge that all citizens give sincere thought to the conservation of our forests; to the embellishment of our streets and highways with suitable trees; to the establishment of more beautiful parks through the planting of trees; that the economic benefits to be derived from well considered orchard plantings be studied, and finally that each citizen shall constitute himself as a committee of one to discourage vandalism, in any form, on all forest, shade, ornamental, street and fruit trees.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of to be duly affixed.

In addition to TREES, the AMERICAN NURSERYMAN and PARKS AND RECREATION magazines have actively participated in this worthwhile endeavor that has had such a fine beginning.

New Volck Oil Spray

"VOLCK" as formerly offered under the name of "Nursery VOLCK" was a "mayonnaise-type" emulsion. This emulsion was formed by combining the insecticidal oil with water and emulsifiers. It has a typical ammonia odor. The emulsion was packed in an open-mouthed tin container or drum. To use the product it was necessary to premix it with additional small quantities of water and then add the "pre-mix" to the total measured quantity of water. The container lid was difficult to remove from the can as it had to be triple-tight to preserve the contents. If the lid was left off the can, the emulsifier broke down and the contents spoiled.

While these were all minor handicaps far offset by the usefulness of "VOLCK", we have had numerous requests throughout the years to make the product easier to use. The improved formula of VOLCK Nursery & Garden Spray was developed to overcome these handicapps. It was made possible by the development of an oil-soluble emulsifier and wetting agent. The same insecticidal oil is used but no water is necessary in manufacturing the product because the emulsifier is dissolved in oil. Due to the elimination of water content, the product now contains 97% insecticidal oil instead of the 80% oil content (By weight) of the "Nursery VOLCK" formula.

The VOLCK Nursery & Garden Spray product in its concentrated form has the same color and appearance as the insecticidal oil itself whereas the presence of water in the Nursery VOLCK formula gave it a milky appearance. The new product, being as fluid as oil, can be packed in bottles or metal cans with small openings. It can be poured out of the container and is easily measured by the use of a spoon, cup or other measuring device. The screw cap can be removed or screwed back onto the container without difficulty.

The improved product mixes more readily with either "hard" or "soft" water.

Weedone Is Deadly Weed Killer

After many years and many products there has finally appeared on the market a weed killer that does what it is supposed to do—kill weeds.

Park Superintendent, State Highway engineers, Nurserymen and Arborists will welcome this fine product which is produced by the American Chemical Products Company of Ambler, Pa. The producer of the chemical is Franklin D. Jones, familiar to all who have attended recent National Shade Tree Conferences.

This product is manufactured from a hormone. Only in this case it has the reverse action, instead of stimulating growth it destroys chlorophyll and tissue. This action continues down the stem and into the root system; although the entire process is not clear.

A great many noxious weeds are completely struction of a prolific suckering old cotton-destroyed by Weedone. Some of the worst are; poison ivy and poison oak; Japanese honeysuckle; poison sumac and a host of others. One interesting development was the dewood stump that had sent up suckers as far as 75 feet from the stump. This should be of great value to park men and arborists.

Although the product is very deadly it does not sterilize the soil nor does it irritate the skin. It is not inflammable.

Trees...

Seventy-Five Tons of American Elm

By E. W. BLACKFORD,
Wausau, Wisconsin

In late July of 1940 it was decided immediately to transplant a large elm. The purpose of this was to save the tree and to make way for the construction of the new home office building of the Employers Mutual Liability Insurance Company and the Employers Mutual Fire Insurance Company.

The extremely hot weather, out of season, full leaf moving, and many other adverse conditions encountered due to construction adjacent required that many special problems be worked out.

Age of Tree—74 years.

Diameter—26 inches D. B. H. (diameter breast high).

Height—71 feet.

Spread of Branches—50 feet.

Estimated weight of tree and ball of dirt—75 tons

Estimated percentage of roots lost in making ball—Some roots on a tree of this size might range out as far as 100 feet on the garden and lawn side of the tree. These were cut down to an 11-foot radius in making the 22-foot ball. Beyond this 11-foot radius the roots would decrease rapidly in size and numbers. However, since these small roots are the ones most able to take up nutrients and moisture it is possible that from 60 to 75 per cent of the normal moisture gathering roots were cut off.

Moisture Loss—Upwards of 60 per cent.

Diameter of Ball—22 feet.

Thickness of Ball—Three and a half feet, average.

Temperature at Time of Work—Highest about 90 degrees.

Shock was considerable during moving. Once the tree was tunneled under and blocked up, only a very moderate amount of water could be applied to the ball on account of the danger of weakening the soil structure and causing a cave-in. There was very little rain or humidity during the three weeks that the ball was cut. An almost continuous breeze increased the evaporation from the leaves. Undisturbed trees along the same street showed much yellowing, wilting, and dropping of leaves. Had this been true only of the tree being moved there would really have been cause for alarm.

It was decided to build up the vitality of the tree as much as possible in the short time before digging. On July 23, nearly one month before the trench was dug around the ball, the area of the ball was injected by the following procedure: A liquid fertilizer consisting of two pounds of Ammonium Phosphate, two pounds of Calcium Nitrate, and one pound of Potassium Nitrate in 100 gallons of water was pumped into the soil through a needle by means of a power shade tree sprayer. Also on the same day and by the same method a solution consisting of 15 teaspoonsful of Transplantone in 75 gallons of water was applied. Transplantone is the trade name of a Vitamin B-1 and root hormone substance, the purpose of which is to lessen the shock to a plant or tree when the roots are disturbed; also to encourage the growth of tiny new rootlets capable of absorbing soil food and moisture.

Photos courtesy C. L. Wachtel.

Closeup of ball showing wire mesh, cable and iron strap as described in text

Ten days after this treatment the tree showed a greener and healthier condition than before. It was decided, however, not to overdo this and thus produce a lush and tender growth of twigs and leaves which would not be so well able to withstand the shock of digging and moving. On August 19, the day the roots were cut in making the ball, a solution of 10 ounces of Transplantone in 150 gallons of water was again applied by the same method.

Early in August and before any digging was done, the tree was trimmed of all dead wood to give it a more pleasing appearance. Also about 15 per cent of the live and unnecessary limbs and twigs were removed to cut down the evaporation surface.

With three churches and a funeral home, traffic, and breeze blowing we were handicapped in waxing the tree with Dowax. This material is an emulsified form of paraffin which readily mixes with water. When sprayed on a tree it dries to a thin film over the twigs and leaves, thus preventing excessive evaporation. On Labor Day the wind and traffic conditions were such as to permit waxing with a power shade tree sprayer. The leaves had already wilted some, although there is no doubt that the waxing helped to keep the leaves on and functioning until frost, about October 1. It was also significant that the twigs still had a waxy coating on the next summer, you might say a winter overcoat and a summer umbrella. It is probable that this extra precaution swung the balance in favor of success, in spite of adverse conditions.

Preparing the Ball.

On August 19 and 20, a trench 3 feet wide and 6 feet deep was dug by hand entirely around the 22-foot ball. The shape of the ball was a perfect circle. All root ends were cut smoothly and painted. Purpose of the six-foot depth was to permit tunneling and applying the timbers under the ball.

The top foot of soil was loam. From there on down the bulk was gravel to fine sand. Every precaution had to be taken to insure against caving-in. The tree was securely guyed to prevent vibration from the wind.

Heavy burlap in two thicknesses was tightly pinned around the sides of the ball, coming up over the top edge about a foot and securely fastened to a rope. After cutting under the bottom edge of the ball, about a foot of the burlap was also turned under there and securely fastened to a tightly drawn rope.

Something yet much stronger must hold this massive piece of roots and earth together when the real tunneling and moving starts. Two lengths of woven wire were run around the ball, over the burlap, and allowing enough to fold over at top and bottom edges to cover the burlap. Securely attached to the top, bottom and center of this woven wire was a three-eighth-inch seven-strand cable. The two ends of each cable were joined by a turn buckle. At three-foot

(Continued on page 14)

Aeration of Tree Roots

By CHARLES F. IRISH
Charles F. Irish Co.,
Cleveland, Ohio

Aeration, according to Webster, means the exposure to air. Soil aeration is the means, natural or man controlled, of maintaining the oxygen content in the soil. As arborists we should be more aware of the importance of soil aeration. All of us realize the vital need of a constant supply of air and its component oxygen for the maintenance of respiration in animal life and how quickly humans die when cut off from oxygen. Most of us think of the leaves, trunks and branches of trees as requiring oxygen but too few seem to keep in mind the importance of the aeration of the soil whereby the oxygen supply to the roots of trees and the soil organisms is maintained.

Respiration takes place in all living cells and therefore a supply of oxygen must be maintained. This is just as true of cells in the roots of trees as it is of foliar cells or cells in animal life. We must also remember that oxygen is utilized by the innumerable soil organisms which decompose mineral and organic matter into compounds in which form they become available and that the trees and plants must have these minerals for growth.

While the knowledge of oxygen as such and the ways in which it benefits plant growth are comparatively recent discoveries dating from 1774. Yet we find that Theophrastus (370-285 B. C.) observed that: "Soil if it is light and porous contributes deeply to great rooting and still more to the formation of long roots and is more vigorous." Proving an early appreciation of the value of soils favorable to good aeration. Evelyn in his Silva (1664) wrote: "For most roots covet air." Stewart in his Planter's guide (1828) recommends that when trees are to be planted in wet locations that they be planted on top of existing soil so that the roots may obtain sufficient air.

MacIntosh writing in 1853, quotes Russell and illustrates Russell's technique for aeration of tree roots, where the grade has been raised Russell's illustration shows the location of drains installed below the original surface grade, thereby effecting drainage of the original root mass. Some recent writers on the subject have proposed placing the drainage on top of the old grade or above the root mass. It is the writer's belief that Russell's suggestion as made about 100 years ago is the more logical and may be infinitely more beneficial for the tree roots.

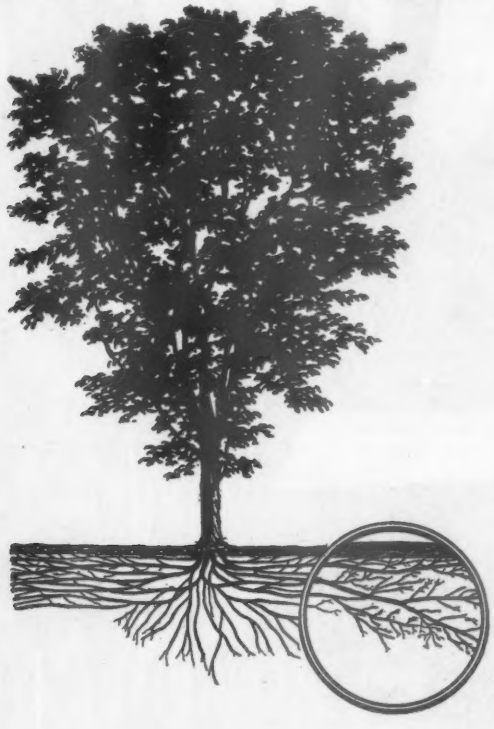
B. E. Fernow in the "Care of Trees" (1910) states, "The fact that roots of trees must breathe is too often forgotten, aeration of the roots is of the most importance." Bergman, 1920, showed that when a Balsam tree was deprived of oxygen for two days, it wilted and when oxygen was excluded from the root for four days the tree died.

Dr. H. C. Young at an early National Shade Tree Conference stated, "I believe if tree men knew more about the role played by oxygen they would not be so worried about disease of trees."

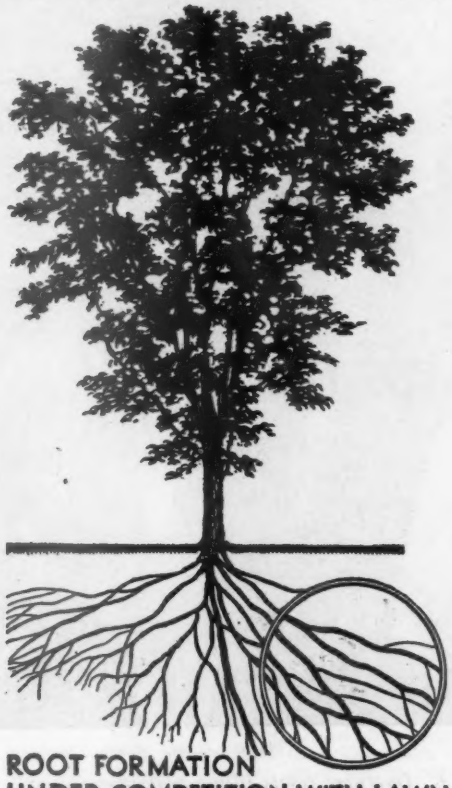
Dr. Lee M. Hutchins has reported finding that a heavy rain can so effectively seal the soil surface as to create an oxygen deficiency within 24 hours that retarded root activities in a crop of field corn.

Livingston and Free reported most roots unable to absorb water in the absence of oxygen. Burgen and Muench state, "Oxygen, therefore plays the determining factor in the type of spread

(Continued on page 16)



ROOT FORMATION
IN FOREST CONDITION



ROOT FORMATION
UNDER COMPETITION WITH LAWN

A Quarter Century of Cavity Work

AUGUST P. BEILMANN

Manager, Missouri Botanical Garden Arboretum, Gray Summit, Mo.

It is not often that the tree surgeon can go to his files for photographs of cavity work, taken a quarter of a century earlier, for comparison with the same cavity today. We are aware, of course, that some of the important organizations may be able to celebrate a "century of progress" in tree care; but for most practicing tree men, a quarter century is still a longish time. Therefore some of these remarks will be of interest chiefly to those men who maintain a lively curiosity concerning a tree filling, and who keep alive a scientific dubiousness concerning the "last word" on cavity work.

The patient in question is the same Goldenrain Tree (Koelreuteria paniculata, Laxm.) which was the subject of an article in the August 1943 issue of TREES. It is not known when the first filling was installed but the condition of the filling is shown as it appeared in 1917. An examination indicates that the work was done quite a number of years earlier. The disintegration of the concrete surface and also the projecting rolls of callus—although the bark edge had not been "traced"—might place the date of this treatment as early as 1910 or even 1900. It will be noted that the cavity itself was loosely filled with bricks, perhaps cinders were packed about the bricks, and a thin layer of concrete laid on the exposed surface. We cannot tell, at this date, exactly what went into the filling; but we cannot question the accuracy of the original caption which stated that here was a "tree improperly filled with concrete". It will be seen that the cavity was not pointed and we may safely assume that excavating was rather haphazard in those days.

The next two photographs are taken from the June 1917 issue of the Missouri Botanical Garden Bulletin. They purport to show a very modern method of filling trees. It will be seen immediately that the 1917 cavity was not well streamlined, the points were too blunt, and judging from its size, it should have been considered as a "basal" cavity and excavated in that manner. We cannot tell what effort was made to remove all traces of infection, but since this was the time when the gasoline blow-torch was considered a highly effective germicide, it is likely that only the very worst wood was removed and the surface of the cavity thoroughly charred with a torch. The Bulletin does suggest applying creosote to the cavity surfaces and fumigating with carbon bisulphide—both acceptable practices today.

"Filled with Asphalt" was the caption accompanying the photograph of the completed filling. However, an examination today indicates that at least some of the sections are concrete, although the entire filling appears to have received a very heavy coating of melted asphalt shortly after installation. The BULLETIN goes on to describe the "latest" method of using asphalt bricks and indicates that these were used to build up the face of the filling. Just what might have been used in back of this is unknown. Of course, a section might be removed for examination, but this would require the installation of a model '44 filling. The

Photos courtesy Missouri Botanical Gardens.

Fig. 1. Improper cavity filling as it appeared in 1917. Filling may have been installed 10 or more years earlier.

Fig. 2 Same cavity in 1917 after removal of old filling and re-excavation.

Fig. 3 Above. "Filled with asphalt", in 1917.

Fig. 4. Right. The 1917 filling as it appears today.

photograph taken in February 1944 shows that for all practical purposes the filling has been successful. Callus growth has been good and the surface has not eroded during the ensuing 27 years. The individual sections are without serious cracks and they are held very tightly.

It seems that the original injury might have followed the loss of one branch, which with the remaining leader forked about four feet above the ground. Some years later an attempt was made to fill the cavity with bricks, cinders and a facing of concrete. Later (in 1917) a more thorough operation was attempted. This time much excavating was necessary and a far more satisfactory filling was installed. Now, the entire operation might be repeated. Pruning cuts somewhat higher up the trunk show that decay is present; in fact there is a large hollow back of the filling. A few bolts appear to hold the filling in place against the thrust of the callus.

No matter what we think of cavity work in general, or this operation in particular, we must admit that the filling served all of the functions demanded of it. It made the tree less unsightly and it provided a support for the callus. We cannot say as much of the surgical excavating. Perhaps decay was checked, it certainly was not eradicated. But then it is very unlikely that surgery was ever responsible for the eradication of diseased wood in a living tree.

Improve Usefulness of Growth Substances

"Carbowax 1500" is a new material which offers promise as a "carrier" to improve the usefulness of growth substances such as those now used in the rooting of cuttings.

One of the difficulties in the use of growth substances is that they are almost insoluble in water. To meet this problem, they are first dissolved in a so-called "carrier" before being mixed with water. The carrier most commonly used is ethyl alcohol. But ethyl alcohol evaporates rapidly, so that when cuttings are dipped in a water solution of growth substances dissolved in alcohol, the growth substance is left on the cutting in undissolved, crystalline form as soon as the liquid evaporates.

The new carrier (Carbowax 1500) improves this situation. It is really not a wax in the true sense; it is an alcohol which is solid at normal temperatures. It gathers moisture from the air (is hygroscopic), which means that any growth substance dissolved in it will be in solution at all times. Further, it serves double duty as a spreader so as to give better coverage.

Preliminary experimental work has shown that dissolving the growth substances in "Carbowax 1500" before mixing with water increases their effectiveness 300 to 400 per cent. This suggests that increased efficiency in the rooting of cuttings can be obtained by the proper use of "Carbowax 1500" as a carrier. Nurserymen will be interested in watching reports of this new material.

Ants Knew When To Desert Tree

Seeing long lines of ants leaving their home in a decayed ash tree, Homer grimes, amateur naturalist, watched for confirmation of his belief in the insects' intelligence. A few hours later a strong wind blew the tree down.

DDT Nearly Ready

The Pennsylvania Salt Manufacturing Company, chemical manufacturers. Philadelphia, Pa., announces that it has completed the installation of facilities for the manufacture on commercial scale of DDT (dichloro-diphenyl-trichlorocthane). .Production has already begun, all of the output for the present being taken by the government for the use of the Army and Navy. The Company states that as soon as military requirements permit and the WPB approves, it will be in a position to supply DDT for preferred civilian uses.

Tree Blown Down, Back

A bad storm blew a tree down on John Errington's farm. That isn't unusual, but a week later a storm from the opposite direction blew it up again almost into its original position. Neighbors are wondering whether it will take root and live.

Where Are "Most Beautiful Streets of Trees in America"

America's most Famous Street Trees. Elms on Fifth Avenue, New York, in front of Rockefeller Center. They have been publicized the nation over; as a result many business streets have been planted with welcome trees.

Photo courtesy Robert Moses, New York Park Commission.

American cities have been remiss in their obligations to taxpayers in at least two respects: The embellishment of streets and boulevards with trees; and, where this has been done, in not providing adequate space or conditions for the proper growth and development of the trees selected.

This piece is not intended as a treatise on the common faults in municipal tree planting, but rather as a start on a campaign to bring to light examples of where street tree planting has produced exemplary proof of the benefit such a function is to a city, and the fame that can be achieved.

However, where in America do we find a famous or really beautiful street of trees? Where is there a Champs Elysee, with its horsechestnuts, or as famed a street as Unter der Linden (if there is anything left of it)?

TREES hopes to encourage competition in a nation-wide campaign among the cities, towns, and villages to find the ten or twelve or fifteen, or whatever the number of really outstanding streets may be, of the "most beautiful streets of trees in America."

According to information we have been able to uncover there are, in North America, eight outstanding streets. The information does not give the trees as a consideration however. The streets and city in which they are located follow: Riverside Drive, New York; Lake Shore Drive, Chicago; The Fenway, Boston; The Mall, Washington, D. C.; Skyline Boulevard, San Francisco; Mississippi River Boulevard, between St. Paul and Minneapolis; Euclid Avenue, Ontario, Calif.; and Sunset Boulevard from Beverly Hills, Calif., to the Ocean.

Mexico has the Paseo de la Reforma in Mexico City. South America, in Rio de Janeiro, has the Avenida Beira Mar. Montevideo boasts of the Rambla Sur.

In Europe there is, of course, the Champs Elysee, Paris; Grand Canal, Venice (hardly likely there are any trees here); Princes Street, Edinburgh; Nevsky Prospect, Leningrad; Ring-strasse, Vienna, and the Paseo de Gracia, Barcelona.

While this campaign is to determine *the most beautiful American streets,* we would be interested in any data pertaining to the features of the streets in foreign countries and good pictures which we would like to reproduce.

TREES will endeavor to generate some real activity in this campaign and invites Garden Clubs, Chambers of Commerce, Park departments, City Foresters or just poor old John Taxpayer to send in pictures (a large one preferably 8" x 10" or better) of candidate for All-American honors.

Thru the Microscope

(Continued from page 5)

under way in Wisconsin for several years and Dr. A. J. Riker and several co-workers recently reported on the present status of the problem (2). Selections for resistance were made among native, young, cone-bearing trees which showed no blister rust cankers after years of close association with Ribes bushes. They subjected about 1,000 grafts and 10,000 open-pollinated seedlings from these trees to natural or both natural and artificial fungus inoculations. They found that within a year a high percentage of the seedlings had blister rust stem cankers whereas only a low percentage of the grafts showed infections in the same period. They point out that the latter observation is encouraging evidence that resistance to the fungus exists among some Wisconsin trees. They also state that "if seedlings from resistant staminate and pistillate parents show sufficient resistance, a means appears at hand for developing a limited seed source within a few years."

Let's hope this work will produce the desired objective. If it does, it will not only help to curb a serious fungus disease, but it will lend impetus to research along the same lines for diseases.

Do Black Walnut Trees Harm Nearby Vegetation—This seems to be a highly disputed point even though arborists and nurserymen have observed from time to time that certain plants growing near black walnuts made poor growth or are killed outright. In the literature, the most frequent references have been on the detrimental effect of walnuts to such plants as tomato and alfalfa. However, the evidence, based largely on observations, was contradictory. The writer was first to call attention to the harmful effects of this tree to rhododendrons and other ornamentals (3). Since the publication of this article, a number of persons have advised him that similar injurious effects were noted on other plants, including forsythia, laurel and yew. The problem was still controversial, however, inasmuch as the evidence were based largely on observations rather than on experiments. Recently Babette Brown of Cornell University (4) described a method of demonstrating that walnut bark produces a substance that is injurious to alfalfa and tomato seedlings. Miss Brown also reports that injury from walnut root bark may be decreased, within certain limits, by increasing the nitrogen supply through the addition of nitrates. On the basis of the latter observation, tree men encountering the trouble might well try feeding affected plants with high nitrogenous fertilizers before recommending either the removal of the walnut trees or the substitution of non-susceptible plants around these trees.

Latest on Chestnut Blight—Arborists who like to keep up-to-date on the chestnut blight situation should read the excellent article, "The American Chestnut. Its Past, Present and Future," by R. B. Clapper and G. F. Gravatt of the U. S. Department of Agriculture (5). Although the authors state that, "On the basis of past experience and in the light of present knowledge we can expect little change in the status of American chestnut," the article clearly answers many of the questions which the laymen often ask arborists.

Galls on Tree Trunks—Swellings or galls of varying sizes and shapes on the trunks of shade trees, particularly maples, are a common sight to arborists and laymen alike Though some of these galls are known to be caused by parasitic fungi and bacteria, the bulk of them are caused by unknown factors. R. W. Davidson and W. A. Campbell report some observations (6) on a gall of sugar

maple which is particularly common in Pennsylvaia forests but which has also been noted in New York and New England. Several species of bacteria were isolated from the center of the galls but none was obtained from the advancing margin of diseased tissue. They feel that if the organisms isolated are responsible for the death of the sapwood in the galls, their effect must be an indirect rather than a direct one. The authors conclude, "Regardless of the actual cause, the gall appears to be caused by some infectious agent which enters the stem when the trees are small and slowly works outward through the living sapwood and encroaches slowly to within one to several millimeters of the cambium with a resultant stimulation at that point."

Water and Growth Rate of Tree—We've all heard the saying, "It's an ill wind that blows no good," yet the ill wind that blew down so many fine trees in New England made possible certain studies that might never have been made. C. J. Lyon (7) has secured some interesting data on the relation between rainfall and the growth rate of trees. These studies were made on trunk sections taken from seven stands of white pine and four lots of eastern hemlock which were felled in the Boston area by the 1938 hurricane. Lyons summarized his work as follows: "The widths of annual rings of wood were averaged for each year at each site and used as indices of growth rates. From the agreement among the four graphs of hemlock growth increments, the years of maximum and minimum growth rates for the area were determined. A similar set of dates was read from the crests and troughs of the seven graphs for the white pine ring widths. Comparison of the relatively high or low growth rates in these years with the rainfall records from official stations near the forest sites brought out the importance of rainfall during the growing season. There was also some evidence of lag and cumulative effects from previous seasons and a general demonstration that fluctuations in growth rates from year to year reflect the variations in water supplied through the soil."

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Withering Malady Hits Orange Trees

A mysterious malady that quickly withers an orange tree today defied efforts of plant pathologists to find a cure.

"You can almost see an orange plant die," Dean C. B. Hutcheson of the State College of Agriculture at Berkeley, said. Universities are co-operating in an effort to solve the disease. The first case was reported in 1939.

Scientists thus far have learned the disease attacks only orange orchards. The only trees affected are those budded from sour rootstock, the plant that grows from a certain type of hardy seed immune to many of the usual citrus plagues.

It is a root disease prevalent in sandy soil, in river bottoms and foothills. First attacking feeder roots, the disease spreads to the larger roots. The leaves then turn yellow, and the plant is retarded, then shrivels.

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Write for Prices and Delivery Service

FANNO SAW WORKS—1805 Magnolia Ave., Chico, Calif.

Seventy-Five Tons

(Continued from page 8)

intervals around the ball two-inch by one-fourth-inch iron bands were placed up and down between the top and bottom cable, and secured to the cables by hooks bent over on the end of the iron bands.

Of course, we have extra slack in the woven wire at the top and bottom edge, due to the smaller diameter of the ball at these points. We take up this slack by kinking the wire every few inches with a hammer or pliers. Now we are ready to tighten the turnbuckles. The cables pulling on the wire and reinforced by the iron bands choke the woven wire and burlap tighter than ever around the ball.

Now with a power shovel a hole is dug 6 feet deep and 22 feet wide around the ball, and wider in the direction the tree is to be moved. This will give room for tunneling and getting the long timbers under the ball. There is no place to pile the dirt so it is hauled away.

With a long spoon-like shovel a hole a foot square is tunneled straight under the center of the ball. A 24-foot timber, 8x10 inches, is placed in this hole, jacked up against the bottom of the ball and blocked in. (Only a few roots the size of a lead pencil were cut off under the ball at the 42-inch level.) Again a tunnel and a timber to the right and to the left until the whole ball is cut off and blocked up. Then two long 12x12-inch timbers are placed at right angles to the other timbers. These are to act as skids or runners and to support all of the others evenly.

Rollers under these skids would soon bury themselves in the sand so a solid floor or tracking must be built under the ball and to the new location. By carefully changing the hundreds of pieces of blocking and the 36 jacks we finally got the floor built under the skids. Now we place hard maple rollers at an angle, but all even under the two heavy skids. We raise the ball, remove the blocking and lower the weight directly on the rollers.

A heavy steel cable runs from the two main skids to a capstan. The tree starts rolling very slowly, turning as it rolls because we have placed the rollers at an angle to the main skids. The tree is to be moved about 20 feet and is to be turned about one-third around so the shortest branches will be toward the new building. To go straight ahead is easy, but to turn is like trying to turn a big car around in a narrow street without backing up or running over the curb. We can't back up. The tree must be turned just the right amount by the time we get it over in line and position, with reference to other trees. It is necessary to jack up the weight several times, reallign the rollers, and proceed a few inches or feet before the tree finally rolls in place.

Now the tracking, the rollers, the two main skids, and about every second timber directly under the ball must be removed and the whole weight left resting firmly on permanent blocking. Some of the burlap is cut on the sides and pulled out, but for the most part the reinforcements are left to strengthen the ball.

On September 9, after about three weeks of work, trucks roll up and dump their dirt. We shovel it under the ball, tamping it as firmly as possible around the blocking. Many more loads of dirt and we start watering it down with a fire hose. A generous supply of Swedish peat moss is mixed with the dirt near the edge of the ball, also some 12-6-4 fertilizer, to give the roots a good growing medium when they start. Watering was daily at first and then weekly until freezing.

The tree had all and more than the usual handicaps of a tree near a construction job, concrete, plaster, stone, structural steel crane, trucks, tractors and bruises, just to mention a few. The next spring a six-foot sidewalk was built across one side of the ball. Ditches were dug two ways for power and light cables, and again for water pipes. Then along came the landscape crew, applying several inches of impervious clay, a layer of native and very acid peat moss, and a layer of top soil. Then came shrubs and lawn with an automatic sprinkling system. Oh for a bazooka.

On June 20th there was gloom. The leaves were drooping and yellowing badly. This is the condition and time when an arborist usually gets ready to pronounce his newly planted tree, dead. However, we decided to take some last desperate and heroic measures. The shrubs, lawn, and fill except under the sidewalk were removed. The fill was very wet and the native peat was stagnant. It had been like a wet blanket, smothering the roots and preventing air and water from getting down to them, for the ball of the tree was as dry as the proverbial powder.

It was decided to again inject into the roots a weak solution of fertilizers and Transplantone by means of the power sprayer and through a soil needle. A few days and the leaves began to pick up. A few weeks and a few more treatments and it appeared a miracle had been performed. New leaves, new twig growth appeared, enough to thrill and bring tears to the eyes of any real tree lover.

Regular liquid applications of plant food have since been made. When pruned in 1944, and after four seasons of growth the tree showed a normal and healthy condition. Now we firmly believe this giant elm will continue to shade and grace the west side of the beautiful Employers Mutuals Home Office Building.

Closeup of shoring, straps, cable and wire mesh used to secure ball of earth.

Steam shovel completing excavation after ball had been prepared for moving. Not yet shored.

George E. Stone

(Continued from page 6)

College campus, with its extensive plantings of trees of great variety, and the Town of Amherst, noted for the fine trees of its streets and commons, furnished abundant opportunity for practical field of instruction and experimentation. Because of his official connection with the College and as Tree Warden of the town, Doctor Stone was enabled to employ these resources to great advantage and much work of permanent value to town and campus was performed by his students, in learning to select, plant, repair and protect shade trees. Stone's Yankee ingenuity was constantly at work devising new and cleverly conceived apparatus for laboratory experimentation and methods of repair and preservation of shade trees. Specially designed tools and apparatus for work on trees were for many years a major feature in his laboratory equipment. Dr. E. P. Felt in his book, "Our Shade Trees," wrote (page 43) of Doctor Stone, "He was the first to give a comprehensive course in America on shade tree care," and this is undoubtedly true.

In the period 1895 to 1914 many future shade tree experts, some of them now leaders in the field, received their early and most valuable training under Doctor Stone. Through his writings and the work of these former students he has exerted a profound influence on the modern development and practice of shade tree care. To quote further from Doctor Felt (page 43), "His inspiring teaching and brilliant investigations materially influenced the development of tree work, and did much to establish an appreciation of the value of scientific study in solving tree problems. It was largely through his work that Tree Surgery, as it was then known, attained a recognized status . . . . "

The product of Stone's research touches many phases of botanical science, largely applied, and mostly in the fields of plant physiology and plant pathology. Some of his more important contributions were in so-called tree surgery and tree management. His writings dwell frequently on spraying and spray equipment (he invented the M. A. C. high pressure nozzle for spraying tall trees); the treatment and protection of wounds and cavities and the materials and methods so employed; crotch bracing, chaining and bolting; tree guards and devices for protection against live wires; moving of large trees, and related subjects. He established himself as the foremost authority on the injurious effects of illuminating gas, electric wires and smelter fumes and his services as an expert consultant were much in demand by utilities and industry as well as by those who thought their trees had suffered from these agencies.

1907. An original device by Dr. Stone. Power-driven gouge on flexible shaft for cleaning out decayed wood in cavities.

In September 1916, the Massachusetts Agricultural Experiment Station published Bulletin 170, "Shade trees, characteristics, adaptation, disease and care," written by Doctor Stone shortly before his retirement. This is a comprehensive treatise on the subject and a glance through its table of contents conveys some idea of the many phases of tree work dealt with in his investigations and teaching. This bulletin has been in great

(Continued on page 17)

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Aeration of Tree Roots

(Continued from page 9)

of roots as well as to their ability to function."

Dr. Tilford recently pointed out that while it is much less physical effort for an arborist to make an examination by merely viewing the exposed parts of a tree and express an opinion on what he sees there, such a diagnosis is incomplete and therefore, apt to be in error. He recommended the examination of the soil and roots as well as the aerial parts of the tree before an opinion is expressed, because, frequently the primary cause of the unhealthy condition may be found in the soil and any injurious conditions observed upon the aerial parts of the tree could be secondary.

So while nature undisturbed by man creates conditions where normally ample aeration is naturally accomplished and trees and plants thrive, where man moves in he frequently changes these conditions and we find the lack of aeration becoming a problem of the first importance. In the natural woodland a condition is established by the mulch of leaves and decaying organic matter which furnishes first a loose porous surface through which atmospheric oxygen most readily passes into the soil and the excess carbon dioxide or its compounds given off by the roots, bacterial and other activities in the soil, can easily diffuse into the atmosphere. It is by this process of diffusion that the gases in the soil constantly tend to equalize with those in the adjacent atmosphere above the soil. Rain falling on such a porous, spongy surface is not lost by run-off but penetrates and, seeping down through the soil pores, draws a fresh supply of atmospheric oxygen behind it. Not only does the rain carry oxygen with it in solution as it passes into the soil but the moisture it furnishes is the medium by which the oxygen is absorbed by the roots. A mulch of leaves also furnishes food and homes for the countless soil organisms which increase the porosity of the soil underlying the surface and hasten the breakdown of insoluble soil minerals into forms available to the roots.

Change in temperature, change in barometrical pressures and wind are other means by which nature effects aeration. The type of soil greatly regulates the ease or difficulty with which these natural processes are able to effect aeration. If the removal of the carbon dioxide and its compounds, which are formed as a by-product of the respiration of roots and soil organisms, is not diffused it will, in slight concentrations, inhibit root activity and when it accumulates in heavy concentrations, it can asphyxiate the roots. In soils containing organic matter in varying states of decay the lack of oxygen arrests normal processes of decay and in this partially decayed condition many compounds may be formed which are extremely toxic to plant life. Schreiner has reported that some of these compounds are so toxic that 2 P.P.M. may be sufficient to kill roots. The working in to the soil of large quantities of green manure may, on some soil types and under some circumstances, produce such toxic conditions.

Where grades are to be raised about trees, it is advisable to remove any large quantity of organic matter before the fill is made in order to avoid the possibility

Photo by TREES.

The Irish Aero-fertil gun used in fracturing, aerating, watering and fertilizing sub-soil areas.

of this type of injury to the roots of any trees. Where this precaution has not been taken, the writer has observed, more rapid death of trees due apparently to the toxic compounds formed than where similar fills have been made in the absence of organic matter and where death was due solely to a lack of aeration.

The amount of oxygen necessary in the soil to maintain optimum growing conditions varies greatly with temperature, soil types and plants. As with oxygen, many conditions enter into determining the amount of carbon dioxide which may be present in the soil before injury results. This will always be greater in the soil than in the air above the soil. Saussure reports that a 4 per cent concentration of carbon dioxide was found injuricus to roots. A normal carbon dioxide content of the atmosphere is .03 per cent while a normal carbon dioxide of soil atmosphere is .2 per cent or roughly six to seven times as great as in the free atmosphere. The natural mulch in the forest maintains the ideal surface and subsurface conditions for root growth because aeration is readily effected. Therefore if practical, we should attempt to create similar conditions about the trees under our care.

The recent swing of fruit growers to mulch culture in their orchard practice is an effort in this direction. In the growth of street and lawn trees this is usually impractical. Even if a mulch of leaves were placed about street trees and means were found to keep the smokers' cigarette butts from setting fire to it, pedestrian usage would so compact it that its purpose would be defeated. However, the unsightly appearance of such a mulch for street or lawn trees makes such a solution impractical. Years ago Dr. Meinecke found that pedestrian traffic was preventing the adequate soil aeration about some of the giant Redwood trees in our National Parks and that the roots in these areas were coarse and that very few fiberous roots were being produced.

Just as it is impractical to maintain a mulch about our street trees so is it frequently impractical to prevent all pedestrian use of the area over their roots, in which case the only alternative is to, from time to time, treat the soil in such a way as to enable aeration to function as well as possible under the circumstances.

Where growth is being retarded through lack of aeration the writer has used compressed air liberated at varying depths in the soil. By this process an interchange of soil air can be effected immediately. Toxic gases in the soil atmosphere are driven out by atmospheric air which is forced in under pressures of 80 to 100 pounds. However, unless a condition is created whereby aeration and diffusion can continue to take place more readily than before the compressed air was used, the result would be quite temporary and probably not worth the effort.

This operation of using compressed air for soil aeration is as follows: Under average street or lawn tree conditions, holes of about 2-inch diameter at 30-inch to 36-inch intervals are bored to the desired depth, usually 18 inches to 24 inches, with a pneumatic auger. The use of an auger is to be preferred to a jack hammer. A specially adapted nozzle on which is mounted a reservoir for fertilizer or sand with valves so arranged that the air, fertilizer or sand, other materials or water may be forcibly introduced into the hole previously bored into the soil. In operation the tip of this tool is inserted in the hole and forced down, thereby effecting a seal which prevents the escape of compressed air or fertilizer from about the tool.

The air is liberated. This usually

causes a heaving or fracturing of the soil unless the soil is very dry. With this first air valve open these sub-soil fractures are kept from closing and while held thus the second valve is opened permitting the fertilizer or sand or other corrective agent to be blown into the fractures. It is possible in some soils to blow in 10 to 15 pounds of sand in one hole.

Having accomplished this, the nozzle is withdrawn and if the soil surface is in sod the remaining hole is filled with a mixture of sand humus. If in a play area, the hole may be filled with coarse sand or gravel so that a permanent vent is created by means of which natural aeration of the roots can continue to function.

By this process a more or less permanent vent, having an expanding base of porous materials with radiating fractures which further increases the soil mass aerated through this porous vent. By repeating the operation at 30 to 36-inch intervals, it is possible to establish a condition over the root area of one or many trees by which oxygen and moisture can more readily reach the root mass and carbon dioxide be diffused. By spacing these vents in line and to the proper depths, it is frequently possible to create sub-surface drainage. improving turf or play areas as well as trees.

George E. Stone

(Continued from page 15)

demand and a large edition was long since exhausted.

In recognition of his valued contributions to the science and practice of shade tree management, the F. A. Bartlett Tree Expert Company at Stamford, Connecticut, dedicated its research laboratory, named George E. Stone Laboratory, to Doctor Stone in 1936.

The Massachusetts Legislature of 1899 enacted legislation making mandatory the annual election of a tree warden by every town in the State. Doctor Stone served as tree warden of the Town of Amherst from 1901 to 1916. In 1913, through his efforts, the tree wardens and city foresters of the State were organized into the Massachusetts Tree Wardens' and Foresters' Association and the official letterhead of the association bears the name of George E. Stone as founder. This association has become a powerful and potent influence in all matters pertaining to the preservation and welfare of the Commonwealth's shade trees, of which her citizens are justly proud. The generally excellent physical condition of public trees throughout the State is a frequent matter of comment by interested visitors and in the last few years has been an important factor in holding in check the spread of the Dutch elm disease.

While trees received Doctor Stone's greatest attention, his interest in plants was by no means limited to this group. In young manhood he collected extensively and his considerable personal herbarium attests to his general knowledge of the plant kingdom. As a student he made a survey and study of the plants of Lake Quinsigamond, largest body of fresh water in Massachusetts.

Neither were his interests confined to his professional field. He found relaxation and enjoyment in classical music and art, especially of the old masters; his garden in which native shrubs, trees and herbaceous plants predominated was his constant joy and haven of retreat. His publications, of which more than 400 are listed, covered a wide range of subjects but his scientific contributions were largely in the fields of plant physiology and pathology. Included are at least 125 items dealing with trees and their care.

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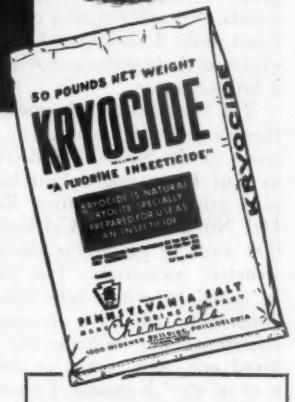

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Trees as Monuments

By Edward H. Scanlon

Recently a Los Angeles newspaper made an impassioned appeal to strike in bronze the famous picture of the Marines hoisting the stars and strips on Iwo Jima. The following day the County Board of Supervisors, on the motion of Supervisor Roger Jessup, ordered a bronze monument cast.

As a museum piece this might have great artistic value, but who, in passing it every day, wants to be reminded of the slaughter on Iwo Jima.

Better, far better, if we forsake these ornaments of the past; in fact all reminders of war. The whole world wants peace and tranquility; how best can this be achieved but by avoiding the ugly reminders of horror. Let us turn our thoughts to memorials of constructive values; to streets of trees for each hamlet, town and city; to parks throughout the nation, where multitudes can find quiet and recreation.

Lastly, let us all, from coast to coast, concentrate on the grandest memorial of all, a memorial that only the Supreme Architect could conceive and create, the grandest trees in the entire world—Redwoods. No other nation can be so privileged; only America can have a memorial grove of Redwoods; any nation can have a bronze statue.

The Redwood Memorial is a live, throbbing reality, made so by a recent decision of the Save-the-Redwoods League in San Francisco, to purchase a 5,000 acre grove of primitive Redwoods in Del Norte County, California. $250,000 must be raised for this living, constructive memorial. The funds are to be raised by public subscription and all Americans will have an opportunity to contribute and enshrine the name of a loved one, who served in this war, forever in the "National Tribute Grove."

This is the supreme memorial. It is peace and dignity. While we are dedicating this memorial we are also performing for all of America and the world, a conservation act, the like of which is only exceeded by the valiant and supreme service of those who vanquished our foul enemies.

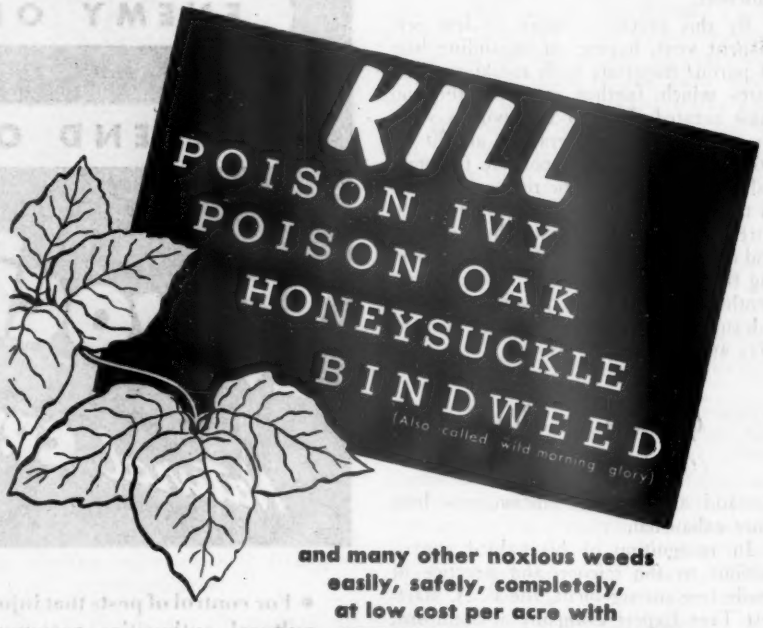
We should not revert to the barbaric in our good intentions to honor those who have served so nobly; let us build, not remain static. Let us consecrate the National Tribute Grove to peace and the betterment of mankind; let us not erect reminders or war.

Tulip Trees Selected As War Memorial

The state tree of Indiana—the tulip tree—has been selected by American War Mothers of Floyd County as a living memorial to their sons and daughters now serving in World War II. The marker placed on the memorial which was planted in a public park read: "This tree is dedicated in honor of our boys and girls serving in World War II."

Creating Forests

More than 4,000,000 trees have been planted in Tsinghai Province, West China, since the launching of the forestation campaign, states a message from Sining, the provincial capital. The forestation movement is growing on the hitherto barren plains of the province.



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